

# PSYCHOLOGY OF AGING

## *Bethesda Conference*

A conference to plan for research on the psychological aspects of aging was held April 25–27, 1955, at the National Institutes of Health, Public Health Service, Bethesda, Md., under the joint sponsorship of the American Psychological Association and the National Institute of Mental Health. Twenty-seven experts in the fields of psychology, biology, and sociology—many of them former leaders in child psychology—met to consider the most profitable methods for studying the aging process from infancy through old age. Public Health Reports presents in brief eight papers from the conference as representative of the five panels of the program.

## Two Aspects of Adjustment



Members of this panel on the personal and social adjustments made by the aging person have fixed their attention on the adult years, from 30 or 40 to 60 or 65. They agree that adjustment has two aspects: an outer aspect, that of social adjustment, and an inner aspect, that of personal adjustment.

According to Kuhlen, external observers evaluate the social adjustment of a person in terms of his objectively measured capacity to function appropriately and efficiently in his dealing with the external world. Efficiency and performance on the job or status and functioning within a group, as viewed by that group, represent examples of social adjustment.

With respect to inner adjustment, Kuhlen believes that a person is deemed to be personally adjusted to the extent that he achieves a relatively integrated satisfaction of his various psychological needs; experiences a pleasurable sense of well-being, contentment, and relative freedom from unpleasant tension and anxiety; and is able to maintain this state of affairs by dealing with frustrating and threatening situations constructively and with a minimum of handicapping emotional stress.

Three papers are concerned mainly with personal adjustment, and a fourth—my own—deals with social adjustment. The papers on personality agree in using concepts which mean that a person who is well-adjusted is able to cope with a complex world. These concepts are: affective complexity (complexity of emotional reactions to a complex world), tolerance of ambiguity, flexibility, expansion. Indicators of poor adjustment are the concepts of

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*By Robert J. Havighurst, Ph.D., professor of education, University of Chicago. As coordinator of the opening panel on research on personality and social adjustment, Dr. Havighurst in his paper summarized and commented on the papers of William E. Henry, Ray G. Kuhlen, and Robert F. Peck.*

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rigidity, simplicity, constriction. None of the three papers attempts to set out explicit criteria for good adjustment, or successful aging, yet each one offers some implicit criteria of success.

Kuhlen writes of the "quality" of adjustment as dependent on the satisfaction of certain basic psychological needs, but his interest lies more in describing and measuring changes in personal adjustment during the adult years than in measuring quality of adjustment.

Peck describes some variables which clearly have a favorable meaning for adjustment, but he does not seem to be willing to postulate these as conveying the meaning of the term "successful aging."

Henry says that affective complexity and clarity of perception of available roles in the individual's social life space might be the major variables for describing personal adjustment. He concludes that these two factors are not seen as necessarily being definitive of the concepts of adjustment or successful aging but as providing an important empirical basis for subsequent study of persons independently judged successful or unsuccessful in respect to general life adjustment or to some specific life role.

Henry writes that all situations in adult life involve stress for the individual and that it is the manner of adaptation to this stress which constitutes the variable of greatest importance in successful living.

It might be useful for members of this panel to explore the extent of agreement and disagreement between Henry's strategy of studying the individual's ways of coping with the complexities and stress of the world and the proposals by Peck and Kuhlen that it is not so much the person's way of adapting to his life situation which is important but rather his retaining the offensive in his approach to life so as to maintain activity and expansion.

Another path for exploration is that of the techniques and the most useful combinations of techniques we can use in the study of adult personality.

Henry relies on projective techniques—the thematic apperception technique and the sentence completion test—which reveal the inner personality. Peck would use an intensive personal interview, supplemented by projective in-

struments, self-ratings, and interviewer ratings. Kuhlen uses attitude scales and other forms of self-report.

Still another question for consideration is that of the nature of the group of people to be studied. Normal people should be studied, we all agree, but should they be selected on a sample basis at random from the population or from certain social classes or occupational groups? Should they be volunteers who are happy to cooperate in our research, or should they be a randomly selected group containing those who are neutral or even hostile to our research?

## Assessment of Aging



In both physiology and psychology, work on animals has made such extensive contributions that from the standpoints of theory and practice it is impossible to trace many significant generalizations to either area, so interwoven are animal and human studies. In the field of aging, however, interest is only now returning to animals after a lag of some 30 years. Yet animals with their short life span and great possibilities for control of conditions are ideal for aging studies. Calhoun examines this area in some detail.

One can say that every scientific problem on human beings at some point dips into the genetic background of the person. Even longevity varies with and within species and leads to the assumption of upper limit to the life span for the individual and the species.

Have we really modified that limit by our

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*By John E. Anderson, Ph.D., professor, University of Minnesota, and former director of the Institute of Child Welfare. Dr. Anderson, as chairman of the panel on the assessment of aging—background in theory and experiment, summarized papers presented by James E. Birren, John C. Calhoun, Franz Kallman, Robert W. Kleemeier, and Eugene Streicher.*

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changing life expectancy, or has it remained substantially the same?

Kallman points out that there is a wide variety of other genetic problems within this general area. Studies of the genetic basis of aging are important both for understanding what happens to older persons and for the understanding of all life.

Underlying human behavior is the nervous system, which not only is our trigger, tracking and holding device, but also the integrator. Modern developments in the construction of computers and automation have given new insights into the range and variety of its functions.

Streicher shows that, although the changes in the aging nervous system are substantial and cumulative, their significance for behavior is not altogether clear.

Here is a link between Calhoun and Kallman. Genetic studies of aging in animal nervous systems along with experimentally introduced conditions and subsequent studies of nervous structures in animals offer much hope, not only as supplements to studies on human beings but also as ways of obtaining knowledge of fundamental relations.

If we consider the human being as a communication system which converts incoming stimulation into activity, the speed with which that system transmits messages becomes an important factor.

Birren's paper is devoted to this important problem. In a sense we are viewing the functioning of the nervous system from another angle. Perhaps the phenomena described by Streicher are reflected in the phenomena described by Birren.

### Environmental Settings

Kleemeier's concern is with the effect of environmental settings upon the behavior and adjustment of older persons. This is a very large area with many psychological implications that have never been fully explored, yet millions of dollars are expended each year in the design of living arrangements for older people.

A multitude of problems of psychological moment have arisen in the design of institutions and homes for older people upon which a psy-

chologist should be able to give advice, but he finds little in the literature with which to answer the practical questions of the architect.

How many foot-candles of illumination should be provided for older people?

How thick should walls be to control noise?

What types of knobs and catches are easiest for old people to manipulate? Where should they be located?

What types of equipment and materials facilitate self-help? How do you teach an old person to learn to use the equipment?

We need to know both the optimal pattern, arrangement, or design, and how to bring the old person to adapt to it.

Another interesting problem of settings concerns the relation of design to findings in other scientific areas. To what extent should the design of living arrangements take into account activities and recreation?

### **Cataloging Changes With Age**

It seems to me that many features of decline in older persons resemble aspects of growth in children. Decline like growth is neither uniform in all individuals nor for all processes and functions within the individual. Quite apart from pathological changes, variations in the rate and character of declines appear.

Much as in the earlier period of growth studies, we need to describe and plot these changes in a wide variety of structures and functions against time or age in order to catalog what occurs. Problems of the interrelations of these various declines then arise.

Is there an overall commonality in decline which can be used as a base from which to analyze the decline of particular parts or structures, or is it the summation of a host of specific declines?

There are also the problems of the point at which decline begins and the point at which it becomes crucial for the functioning of the part and of the organism as a whole. These problems resemble those of the initial and terminal points for growth.

In addition, we need detailed information on the effect of age upon the rate of recovery from insults and upon the rate of learning. Both of these involve specifically designed experimental

studies, with care exercised to explore the phenomena at several scattered age levels since we need to know the age ranges over which such basic mechanisms operate.

In modern psychology there has been a movement toward so-called hypothesis research in terms of theoretical models and constructs. But in the study of living organisms such developments represent an advanced stage in the history of science, which appears only after a great wealth of descriptive, observational, and crude experimental data is available. From this point of view the scientific study of aging is still in the exploratory and programming stage.

Studies, then, of a variety of structures and processes made on cross sections of persons sampled by age and by other criteria from the population in ways that can be described with precision are badly needed. We find many areas of meager information on what seem to be simple and obvious variables. Our cataloging has been haphazard rather than systematic.

### **Neglect of Sampling**

In contrast to the many well-designed studies at earlier age levels, we find masses of anecdotes, case studies, and surveys often presented without specific age reference. We find many studies in which individuals from 60 to 85 are grouped together without any age breakup of the data, yet no good basis exists for this grouping since we know that the change that occurs from 60 to 85 is tremendous.

We find much neglect of sampling. Some of the studies in the late 1920's set up better sampling controls than do more recent studies. To a much greater extent than in any other area, investigators on aging take whatever subjects are at hand. Often, even when available subjects are used, no attempt is made to define the sample in terms of such standard categories as education, socioeconomic status, and occupation.

### **Areas of Research**

As the human being moves forward in time, he carries with him many functions and capacities which together make up his personality. We may well ask questions about the effect of aging upon different classes of phenomena in

order to envisage various research possibilities.

1. There are undeveloped capacities. Generally we assume that of the resources available at birth only a few can reach full potentiality because of the limitations of time and the high selectivity imposed by the fact that the person can only do one thing at a time.

We may well ask how long such capacities can be retained and how and when they can most effectively be activated? To what extent do they depend on other characteristics that change with age?

If the resources of an older group of persons could be explored and deliberate attempts made to develop particular capacities, we would learn more about holding mechanisms as well as about educability.

2. There are the emergency reaction mechanisms which are called into play when stress arises. In addition to the repair and learning mechanisms, these involve the emotional and motivating devices which underlie adaptation, adjustment, and problem solving in a very broad sense. We need data about age relations, the preservation of the mechanisms, and their interrelations with other functions.

3. There are the skills and knowledges of the person, the thousands of organizations of behavior in all degrees of complexity built up during his life and carried forward in some degree to later periods. Many are kept functioning by incidental practice. All have some degree of dependence on subordinate processes. They are affected by growing deficiencies in sense organs, muscles, in communication pathways, and in subassemblies.

4. There are the attitudes and value systems of the person, which are products of life experience that seem to be carried forward with even more stability than many of the skills and knowledges. We need knowledge about the origin and maintenance of rigidity and flexibility in the system as a whole, as well as in the various parts and functions.

### **Preservation of Function**

Finally, I come to what I consider the most important research problem—the relation between use and activity and the preservation of function. The hypothesis may be formulated

in general terms as “energetic activity accompanied by deep concern delays deterioration for a measurable time.”

This proposition has both physical and psychological implications. On the physical side, there might be an optimal activity level for maintaining the best tone and greatest functional effectiveness in the bodily mechanism. On the psychological side, there might also be an optimal level of functioning for preserving tone and effectiveness.

The principle is related to a biological principle of greater extension, namely, that use both increases and preserves functioning and that in a living organism a minimal rate of interchange with the environment results in deterioration.

In considering this proposition it becomes clear that deterioration will ultimately come because even apart from pathological changes, the force which we call life runs down. But potentials under optimal conditions are probably far greater than we ordinarily assume. If we could throw out the cases in which there is failure of a specific organ or function and direct our attention to a group of essentially sound, normal individuals moving along their course, the basic principle would become clearer.

The practical importance of this proposition, if established, grows out of the fact that the amount of use of an organ or structure or of the organism as a whole is, within limits, under our control. For the organism without pathology, it is almost the only factor which is under direct control. Yet when we search the scientific literature, we find little direct evidence supporting or denying the principle. Our practical literature now makes the basic assumption that participation, interest, and activity contribute to health. But we seem to be just at the end of a period when precisely the opposite assumption that inactivity promoted well-being, seemed to be generally held.

Moreover, in the popular mind the myth of retirement and the general conception of aging seem oriented about the principle that absence of activity is both beneficial and preservative.

I would like to know whether human beings wear out or rust out and when the process starts.

I would also like to know how to preserve and increase effective functioning.

And I would like to know the answers not only in terms of organisms as a whole, but also for particular processes and functions.

## The Aging Nervous System



Anatomical, physiological, and biochemical alterations of the central nervous system are possibly more intimately related to the behavioral aspects of aging than with almost any other single phase of psychology. However, the degree to which biological transformations modify the attributes of personality and mental ability remains largely unevaluated. The purpose of this paper is to highlight the major results of research on organic age changes in the brain, and no attempt is made to present a comprehensive review of the voluminous literature.

A number of distinct neuroanatomical alterations are usually encountered with advancing age. Brain weight and size are diminished by several percent, and the volume of the cerebrospinal fluid is increased. The dura mater is thickened and may contain deposits of calcium. Cell counts indicate loss of neurons accompanied by gliosis. Microscopically, changes include neurofibrillary thickening and contortion, deposition of argentophile material (senile plaques) of unknown origin, and the accumulation of pigmented substances (lipofuscin) composed of lipid and protein which may be derived from mitochondria. Anderson observed other histological transformations, such as hypochromatic staining of the Nissl substance, nuclear basophilia, and vacuolization. Although these apparently pathological alterations in the structure of the nervous system do not seem to have definite behavioral correlates, it is often assumed that advanced pathology of

this nature is accompanied by functional deterioration. However, with very few exceptions, the mass of data recorded on this subject is qualitative, and as yet it is uncertain whether or not senile dementia is associated with the pathology of specific regions of the brain, such as the thalamus. Of course the modifications that are observed in the aged brain cell do not constitute presumptive evidence of altered neuronal function.

### Electrophysiological Changes

Certain electrophysiological changes, such as slowing of the alpha rhythm and elevation of the threshold to electroshock, have been definitely associated with the aged nervous system. The aged usually manifest several neurological deficits as reflected in sensory loss and the absence of reflexes such as ankle jerks. Little is known of age changes in neural integration and synaptic transmission although Birren has clearly demonstrated in rats that auditory and electric shock reaction times increase after 24 months of age. Since the electrophysiological characteristics of peripheral nerve are normal, it appears fairly certain that the increased latency reflects alterations in central synaptic and neurointegrative mechanisms.

It is the contention of some investigators that mental aberrations associated with senility are primarily the result of subclinical vascular impairment which affects certain sensitive cortical regions. This would imply that the psychosis accompanying cerebral vascular pathology has a similar etiology to that of senile dementia, except for the extent and locus of the lesion. Others maintain that these two conditions represent distinct clinical and pathological entities, although some degree of arteriosclerosis is usually evident in most autopsy material independent of the presence or absence of behavioral symptomology. It should be emphasized that the occurrence of systemic arteriosclerosis is not necessarily indicative of cerebral involvement since the process of vascular aging in the systemic and cerebral vessels is dissimilar. In the rat, there is little evidence of neurovascular pathology accompanying the aging process, and it is therefore an ideal animal in which to study

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the aging nervous system without the complications imposed by vascular dysfunction.

As a rule the aged brain is more than normally susceptible to insult by vascular insufficiency. For example, therapeutic ligation of one common carotid artery in the older individual commonly produces a loss of consciousness. However, if the operation is carried out in a series of steps, syncope is often absent. Clinically, coronary insufficiency in an older person is sometimes diagnosed as apoplexy because of the predominance of neurological symptoms, and mental recovery is usually rather prolonged and may be incomplete. Cerebral blood flow is diminished with age, but only to about the same extent as the cerebral metabolic rate, that is, from 10 to 25 percent. It is still a matter of conjecture whether vascular pathology or neuronal loss is the primary cause of these effects.

### Biochemical Changes

Changes in the chemical constitution of human and animal tissue with advanced age have been observed for a variety of substances. Increases have been reported in the levels of sodium, lipid, calcium, and iron, and decreases in the concentrations of ascorbic acid and potassium. The water content of rat brain diminishes with age although in human material both increases and decreases have been observed. Also, a decline in the solubility of tissue protein has been noted.

The oxygen consumption of rat brain tissue measured *in vitro* decreases after 2 years of age. (Approximately 50 percent of the animals survive to 2 years of age, and about 1 to 5 percent are alive after 3 years.) The data reviewed by Kety indicate that the cerebral oxygen con-

sumption of unanesthetized male patients is approximately 10 to 25 percent lower in older subjects than in young men. However, the cerebral metabolic rate of "normal" old people and of patients with cerebral arteriosclerosis, or senile dementia, are essentially similar.

The rate of synthesis of neuronal protoplasm as a function of advancing age has yet to be determined although it is precisely this factor that is thought to be fundamentally implicated in the aging process. Thus the time required for the regeneration of sectioned nerves is prolonged in the 2-year-old rat.

There appear to be several rather profitable directions for research in neurobiological gerontology. The relationship of histopathology both to neuronal function and to behavior remains to be demonstrated. Progress in this sphere awaits the quantification of morphological data in terms of cellular loss, gliosis, and possibly alterations in the ground substance of the brain. On the biochemical side, major issues center about the rate and nature of enzyme activity and protoplasm synthesis in advanced age. Electrophysiological studies are also sorely required to evaluate the consequences of sensory impairment, synaptic interrelationships, and the efficiency of facilitatory and inhibitory mechanism responsible for neural integration.

The analysis of fetal and neonatal material at various ages constitutes one of the classic methods utilized by biologists to study structure-function relationships and to investigate the underlying mechanisms of cellular activity. At these early developmental stages there is a fairly good correlation between nervous structure and behavior. Unfortunately few of these investigations have been extended temporally to include mature and older material although

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“. . . what can I, upon the verge of my seventy-fourth birthday, with a shaking hand, a darkening eye, a drowsy brain, and with all my faculties dropping from me one by one, as the teeth are dropping from my head—what can I do for the cause of God and man, for the progress of human emancipation . . . Yet my conscience presses me on; let me but die upon the breach.”

—John Quincy Adams (1767–1848)

the fundamental process of aging in cells has been studied by physiologists for almost a century. At the present time attention is focusing on these issues, not only because of the growing medical problems in this area, but also because of the unique basic biological information which can be elicited by such investigations.

## Changes in Speed and Timing



The slowed reactions which are associated with the aging adult may be without apparent significance for the individual's social roles, esthetic values, or happiness. Yet, as a vantage point for exploring the nature of the changes in behavior and the aging nervous system, the study of age changes in speed and timing holds promise.

Speed and timing are important in survival. Even turtles or porcupines, which use a specialized form of passive defense, usually require a rapid timing of the defense reactions. The speed factor appears to be intrinsic to many types of activities. Individual differences in speed in the young adult may be largely a dependent variable in relation to motivation and other aspects of personality, but in the aging person speed or response latency (meaning the interval between stimulus and response) appears to be an independent variable for attributes of personality.

### Status of Time Measurements

Time measurements may be a very sensitive indicator of minimal changes in skills and may be used to differentiate levels of ability wherein no errors are made. When we are learning a mental or manual skill, speed continues to im-

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prove beyond the stage of making errors, but when a skill declines, the speed or timing may be affected before errors are noted. Time measurements are likewise useful in describing behavior and also have conceptual potential in linking psychological and physiological phenomena of aging.

Despite convincing evidence of age changes in speed of response, the measurement and analysis of time differences have not been regarded favorably by many psychologists, presumably because they reflect adversely on the performance of older individuals.

In mental testing of the elderly, time measurement is often avoided because time limitations are regarded as arbitrary penalties against the older person. Such views are without experimental validity. Recent physiological studies suggest that measurement of speed of simple responses can be useful in assaying the mental status of aging individuals. A speed writing test, for example, differentiated more clearly between patients with senile psychoses and control subjects than did various combinations of standard mental tests.

### Psychophysics and Aging

Research on aging has a deep concern with psychophysics by virtue of the kinds of changes which may occur with age in the relations of responses to properties of the stimuli. Psychophysics is concerned with relations between a physical continuum (stimulus) and a psychological continuum.

In general, the higher the intensity of a stimulus the greater must be the increase in intensity to be perceptible. The bearing of this relation to aging is seen in the results of Szafran. His findings that older persons benefit relatively more than the young from increased illumination prompt the question whether the age changes in sensory function are limited to the minimum energy required to stimulate or whether the whole range of discrimination has been changed.

In vision, it has been shown that the minimum light threshold is higher with advancing age. Coppinger's study in which he measured the flicker fusion threshold at three different brightness levels in young and elderly subjects

showed a smaller absolute increase for the elderly in threshold as brightness was increased.

This information can be used to equate stimulus intensities for young and aged subjects. If a stimulus is weak for an elderly subject, then presumably greater improvement will be seen in his judgments as the stimulus magnitude is increased than would be obtained in judgments in a young subject.

### **Speed and Difficulty**

A question of concern to many psychologists is how the performance of the elderly differs from that of the young when tasks are varied in difficulty. The term difficulty is generally applied to the stimulus and is defined by the response. Thus, a difficult problem is one which takes a long time to solve and which has a low probability of being solved correctly.

Kay reports experiments in which he found that the speed of response for the elderly was more affected than that of the young when the distance between the response keys and stimulus lights was increased. He makes a strong plea for controlling task difficulty.

My associates and I have studied both the probability of a correct response and speed in simple addition of columns of digits of varying length. As the series of digits was increased, the probability of a correct response declined more rapidly for the elderly than for the young, and the time required changed relatively more for the young than for the elderly although the absolute increases in time were greater for the elderly.

In a similar study of verbal fluency and aging, we measured difficulty by the number of words in the category to be associated. As fewer words became available, the elderly showed a greater absolute increase in time but a lower relative increase than the young subjects.

In verbal fluency there is no external stimulus which must be perceived. The subject generates his own associations according to a criterion or set. Thus, since not all of the changes in response latency can be attributed to alterations in sensory perception, there is the suggestion that internal associations in nor-

mal thought processes may be slower in advanced age.

We can infer that even for easy or familiar material there exists a type of latency in the linkage of perception and overt response which becomes slower in the elderly. We might also ask whether there is any relation between the speed of doing a task of near zero difficulty and the rate of change in performance as difficulty increases. In aged persons there is reason to suspect that the initial constants of performance bear an important relation to performance at higher levels of difficulty.

### **Serial Movements**

As a skill deteriorates it may again assume the quality of separate movements. There is evidence in Kay's experiments that older individuals have difficulty with timing of sequential tasks, but the role of the longer response latency in the sequence has yet to be thoroughly explored. In our own work we have seen that the handwriting of senile individuals tends toward a series of discrete movements instead of a smooth overlapping.

Timing appears to have a perceptual character—one "sees" or "feels" the right moment. If the serial elements of information follow one another too closely, the subject frequently does not respond. It is not known to what extent the discrete character of many activities is a result of altered perception.

Perhaps the study of age changes in humor in the adult years has been neglected from the viewpoints of timing as well as the kind of material which elicit laughter. This is an excellent field for a projective and neurophysiological study in which the content or meaning of events can be coupled with observations about how the content is handled by the nervous system.

### **Speed and Inhibition**

Perhaps more common in daily life than the demand response of the reaction-time measurement is the situation where the stimulus is anticipated and received in advance of the appropriate moment for the response. Good timing is thus as much a matter of inhibiting a

response until the proper moment as it is a matter of facilitation. Before regarding the slow behavior of the older animal as adaptive, it should be recalled that the aged animal cannot react quickly under any circumstance. Similarly, the slowness of an aged person crossing the street is maladaptive.

A distinction is often made between the brain of man and lower animals on the basis of size and possible combinations owing to man's greater number of neurons. A functional progression might also be emphasized—as one ascends the phylogenetic tree, animals become more able to delay appropriate behavior without the behavior being forgotten.

There is considerable evidence for a longer latent period with increased age, but further work is required to verify the existence of a reduced upper limit of time beyond which the response pattern disintegrates. Responses from senile subjects suggest that if a relevant response is not evoked in some maximum interval the stimulus or task has to be reinstated in order.

The hypothesis is that an age change occurs in the latent period and also that the maximum time a response may be delayed is reduced. Within these time limits the older person is apparently less able to inhibit a response. The evidence for this change in inhibitory control ranges from studies of language and learning to negative functions.

A recent study confirms the finding that the senile are both slow in their responses and show less inhibitory control over their associations. This evidence prompts the question whether the variable is not one of a dominant priority of association based upon experience rather than inability to control or inhibit an overlearned association in deference to an appropriate one. Results of learning experiments, however, suggest that with advanced age it is relatively more difficult to modify an older response than to acquire a new one.

Altered inhibitory control appears to be a more important variable in the behavior of the aged than is the priority of past experience or reduced ability to learn. To avoid a paradox in explaining the data it seems necessary to adopt the view that the responses of the elderly are faster relative to their latent period.

### **Applying Our Knowledge**

Perhaps we can make attempts to link results of mental tests, psychophysics, and neurophysiology by means of time and timing measurements. Knowledge of this kind may be applied for human benefit in three ways:

If defects associated with aging become clearly defined and localized, then particular environmental stresses may be reduced by engineering around the limitations.

In critical job performance, selection of personnel may be used to reduce particular stresses.

With adequate insight into the changes of aging it is likely that we can begin to develop social and biological prophylaxis to minimize the development of defects which are highly resistant to reversal once they appear.

The aged nervous system appears to be more determinate—the response tends to be a direction of the stimulus. There is, of course, the tendency to cultivate certain types of redundancy, that is, the social graces, and it is of interest that the social facade may be the last bit of behavior to disintegrate in a senile psychosis. The cultural pattern determines which areas of our behavior may be novel and which are expected to be predictable.

Cultural influences determine the sources and extent of motivations in the elderly. It may be a mistake, however, to assume that merely by raising the level of motivation, ability to learn always remains unimpaired. Thus, it is not easy to see why, if motivation is a dominant variable, elimination of errors for the elderly appears to be a more difficult process than acquisition of new responses.

Kay raises a most important issue when he questions the assumption of lower motivation as an explanation of the performance of the older individual. The assumption is tenuous that ability to learn remains unimpaired, whereas the motivation to learn declines, if only because of the difficulty in separating ability and motivation on an operational basis. Behavior is not infinitely plastic as evidenced by the persistence of patterns of neurotic adjustment. Further research should reveal information about life patterns which sustain plasticity of behavior with increased age.

# The Intellectual Functions



Members of the panel on perceptual and intellectual abilities have discussed the strategy of attack upon problems of aging from several points of view.

Kaplan emphasizes the importance of comparative studies in normal and pathological groups, pointing to the need for more appropriate psychometrics, for better procedures in differential diagnosis, and for assiduous effort to coordinate psychological data with social, medical, and biological findings.

We do not know the extent to which psychotic deterioration has elements in common with normal decline. Kaplan makes the sound point that, until we have learned more about the nature of the senile psychoses, it is obviously unsafe to predict the ultimate role of psychology (or, he might add, of other disciplines) in the control of these disorders.

Mensch calls attention to gaps in our knowledge concerning the aging of sensory processes and touches on the problems in social perception and self-perception and their relation to personality. Perception is a topic of considerable current interest in the psychological laboratory but quite largely on the basis of theoretical formulations which ignore individual differences and age differences. Age changes in the sensory and perceptive processes should be examined in relation to physical and mental health and to experimental treatments such as in the hormone studies at Washington University.

Owens points to the need for environmental studies with older persons, as has been done for children. He would have studies of the influence of educational factors, the intellectual

demands of an occupation, and the effects of the social environment in terms of social status or of rural versus urban living.

## Need for Longitudinal Studies

All three agree as to the special need and unique value of longitudinal records. This rarely practiced approach is strongly advocated by Bayley, who emphasizes the need for obtaining information about individual differences in growth patterns.

Growth in both mental and physical traits may occur in many different channels and with idiosyncratic changes in rate. These changes are partly psychometric, owing to changes in test composition, and partly environmental. To some extent, however, they reflect an intrinsic patterning which cannot be predicted from a study of the external environment.

Individualities in growth may constitute long-term trends, as in the slower rate of mental growth of the feeble-minded, or short-term variations which have been conceived as related, to some extent, to the less adequate homeostatic mechanisms of early childhood. But the later years may also be marked by idiosyncratic changes, which can only be traced and related to antecedents if observed as phases of a life history.

## Current Studies

Bayley and Oden, in their study of a university group with extremely high ability levels, have shown that the gain in mental test score within an age range in which a decline is usually registered may be attributed partly to the high degree of selection in the sample and partly to the nature of the tests, which were essentially vocabulary tests (analogies and synonyms-antonyms). The hypothesis may be offered that at the extremely high ability levels of this group, the analogies test presents a mental task chiefly discriminating with regard to the knowledge of words.

In reviewing the work Conrad and I have done with a rural group, I have shown that while the information and opposites tests resist age decline, the task of analogical thinking becomes increasingly difficult in this sample, apart

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from changes which can be attributed to speed of reading.

Owens has found significant gains in several mental functions between the ages of 19 and 50. Since many studies have shown continued improvement in mental test scores during the years in college, possibly these gains were due chiefly to the fact that testing started before the end of adolescent mental growth. The growth from 19 to 23 in some functions perhaps was sufficient to mask an actual decline in the later decades. Special interest attaches, however, to the fact that for those retested at 50 the average alpha score was at about the 70 percentile of the scores at age 19, whereas for the same age interval in the same test Conrad and I found a decline of almost the same amount. To me this implies that the differences between our results and those of Owens are chiefly an expression of the age increase in variability, which is found in so many aspects of physiological and psychological functioning. Owens offers two possible explanations of increasing individual differences: the cumulative effects of differential decline at different ability levels and the influence of organic impairments at all ability levels. It is not clear that the latter would significantly increase variability in intellectual functions unless the weight of impairment were greater at the lower levels.

Among children, the correlation between intelligence and measures of health or of freedom from physical handicap is nearly always found to be positive but too low to suggest an important degree of interaction. Over the decades, however, the cumulative effect of this relationship may deserve greater consideration, particularly when the decline in homeostatic functions makes it more difficult to resist the persistent and increasing drag of other impairments.

Renewed emphasis should be given to the necessity of studying the positive aspects of age changes, as well as the characteristic age losses. It is not realistic to expect that mental functions will be immune to the age changes which occur in other processes. But the role of intellectual abilities in social and occupational adjustment may not be the same at different ages. With diminishing mental speed and power, greater support may be enlisted by

some individuals from the reserves of skills and knowledge created through experience and from superior work habits. We need more information as to the conditions under which these reserves are best brought into play. At the highest levels of creative endeavor, it is probably rare for compensating factors to operate effectively beyond the middle years of life. But in more routine tasks, of possibly great social importance, the decrements in ability may for a long time be more than matched by increments in other work factors.

The study of these positive features of performance in later life deserves more attention than it has received in the past.

## Education of the Aging



Many of the studies since Thorndike established the fact that older people can and do learn have been concerned with showing how they learn and particularly in what way their learning differs from that of younger persons.

These studies have shown that the learning of older individuals, as compared with that of younger adults, is characterized by a decreasing gradient of efficiency, as expressed in both errors and time scores, a greater use of habitual pattern of response, a more concrete approach to test tasks, a tendency toward feeling of inferiority in learning situations, a beneficial effect from recent practice in learning and recall, and a difference in ability to remember verbal rather than abstract materials.

Application of these findings would allow for some definite modification of educational techniques to take account of the special characteristics of the learning process in older adults.

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*By Wilma Donahue, Ph.D., chairman of the division of gerontology, Institute for Human Adjustment, University of Michigan, and a participant in the panel on learning, motivation, and education.*

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Some further investigations are indicated, however, before present-day knowledge is crystallized into an educational psychology for later maturity. Among the questions needing further study are some related to selection of test populations and to learning ability and education of older adults.

### **Selection of Test Samples**

The older adult group is not homogeneous. It consists of at least two subgroups: those who are to be classified as the aging and those who may be considered to have become definitely aged. It is particularly undesirable to lump these groups together in a single group, 50 and over, or 60 to 80, when considering the psychological effects of aging.

In the first group, the normal processes of senescence are not so profound as to have seriously changed the functionality of the individual. He is still coping effectively with his environment, still able to concentrate long enough and well enough to carry out instructions in test situations.

For the second group, degeneration may be assumed to be quite widespread; the individuals are apt to show symptoms of confusion, disorientation, and inability to continue independent living; or if they manage to maintain themselves, it is at great personal effort. In test situations, they tend to lose the set and to forget instructions before the task is completed.

In selecting samples of older adults for study, careful consideration needs to be given both to the use of criteria which will discriminate the aged from the aging and to other factors such as education and intelligence.

Other variables which should be considered are those of occupation, health, motivation, recency and extent of practice in skills required by the test, and environmental conditions in which the test is performed. Only when such variables are controlled can comparisons be made between different age groups with assurance that the individuals compared are equated on points effective in determining test scores or performance. The investigators who have been careful to equate some of these variables are the exception, and many studies need to be repeated under better and more controlled conditions.

### **Learning Studies**

The classic studies of Miles, Jones and Conrad, and Foulds and Raven have produced age curves with the same characteristics as the one described by Thorndike: a rapid rise to a peak efficiency in the twenties, then a slight down gradient for the thirties and forties, followed by an acceleration of the negative gradient. The shape of the curve remains essentially the same regardless of the nature of the material learned, but the magnitude of the change depends on the type of material learned.

Perhaps past studies have been definitive enough to establish the fact that age brings disablement in learning ability, but there are a number of further investigations which appear to be needed before such a conclusion is adopted unequivocally.

It is possible that the shape of the learning curve, based as it is on studies of groups of subjects of different ages, does not necessarily represent changes in the ability to learn with advancing age but may reflect the early onset of degenerative processes in a significant number of subjects.

Lack of criteria for measuring the early senescent changes may make it impossible to avoid an adverse effect on the average test performance of the age group. However, with the new Wechsler intelligence scale, it should be possible to select a group of the most effective oldsters in comparison to the norm for their peer group.

Investigators who have compared a younger with an older group of superior and presumably undeteriorated men usually show the older group to be definitely handicapped by what is assumed to be a slowing down of the mental processes. This conclusion, however, should be looked at carefully from the point of view of the attitudes and qualitative differences in the approaches of older learners as compared with those of younger ones.

For reasons known only by speculation, the older person approaches a learning task with a considerable feeling of inferiority, especially if he knows that his performance is to be compared with that of younger learners. Camp concluded that an older man does not differ from a younger one in his memory for recorded events or in his ability to learn but that inferi-

ority feelings constitute an emotional handicap to his learning.

Another study which illustrates the insecurity which older people feel when required to learn is that reported by Welford. He found that subjects in their twenties seemed to approach the learning task without any clear idea of what they were going to do and allowed the task to dictate their method while subjects in the thirties, forties, and some in the fifties and sixties asked questions about the methods of learning they should adopt before beginning their first trials. Apparently they felt the need to evolve a technique before beginning to work and hoped thereby to perform more intelligently.

Other interpretations, however, can be placed on the behavior of these older subjects. It may represent an attempt to apply some habitual type of solution to the new problem, thus avoiding the exertion of new learning. It may indicate less fluidity in thought processes than those of younger people, thus causing the older learner to take a more concrete approach to the problems. But it may be equally plausible to assume that the longer experience of older people has taught them the disadvantages of error and the advantages of succeeding in competitive situations, thus invoking some negative feelings toward any learning situation.

When the older student frankly adopts the eagerness for learning found among younger people, he frequently excels his younger classmates. But when he is defensive and fails to accept an exploratory learning approach, the experience is likely to be one of great frustration and emotion, and one which no amount of application can overcome. Studies are needed which will make clear the extent to which the difficulties of older people in learning are those resulting from changes in ability and to what extent they are the effects of experience and unfavorable attitudes.

#### **Effects of Practice in Learning**

Lack of practice in learning may account for some learning disability among older adults.

Thorndike, like the doctor who prescribed digestion as the best cure for indigestion, sug-

gested that adult learning is probably a partial cure for adult inability to learn.

Sorenson, undertaking to test the theory that disuse—as expressed by the absence from methods used in acquiring information for university study—is the explanation for apparent disability in college courses with advancing age, reported that the slight disability of those who have not been engaged in vigorous learning for a period of several years can be overcome by resumption of study.

Further studies are needed to determine to what extent the renewed ability to learn and remember accruing from classroom experience can be transferred to the more casual living situations:

Must practice be provided in all types of learning, or does the training in learning one type of material serve as an antidote to difficulties in learning other kinds of material?

Is the improved ability to learn reflected in increased mental alertness in other situations?

How much learning must take place in order to restore the ability to peak level of efficiency, and how much must continue to take place to keep it there?

Do the various levels of intellectual ability respond to practice in adult learning in the same way, or is practice necessary only for the less able?

#### **Education of Older People**

Few studies have been made as yet to determine the teaching methods and course content most useful in training older people. At present we must rely on known effective methods for children and youth. These may not differ greatly from methods which will be found to be most effective for older learners, but some adaptations undoubtedly are required.

Anderson says that young people and older adults improve performance with continued practice under motivation. Both start learning a task ineffectively and gradually attain expert skill. Both respond in the same way to skill of teachers, use of audiovisual aids, dramatic presentations. Both are strongly influenced toward learning by what their contemporaries do.

He also described differences between the two

age groups. The older individuals bring an accumulation of experience to the learning situation which may help or hinder the new learning. They are more concerned about the effects of their errors. They are more difficult to motivate and less willing to learn for the sake of learning.

Studies of motivation of older people to participate in any task or program are among the most pressing of today's needs. Literally, at present, much more is available to older people in the way of education, recreation, health programs, and so forth, than is being used by them. The task is how to motivate the aging person to want to take the initial step required to become a member of such groups and programs. The problem is complex and needs to be broken down into its several components.

Some of the difficulty lies in our lack of knowledge about how to communicate with older people. We know very little about how information reaches them, what channels of communication are open to them, and what relative values they place on different sources of information. Although radio listening and television viewing are common among the group, the effectiveness of the participation of the older person in this type of communication is practically unknown. Further, the extent to which information gained in this passive fashion can be expected to result in action is also still to be determined.

There is considerable resistance to participation in educational activities because older people do not feel that it is permissible for them to go to school. It is not until deeper understanding of the need for continued creative expression comes about that many older adults will take part willingly in learning activities. How to change attitudes of this type constitutes an important field of research.

Studies on the motivating values of different factors such as methods for presenting stimuli, knowledge of results, active versus passive participation, timing repetitions, reinforcing experiences, reward and punishment are needed as a basis for making adaptations in teaching methods and for inspiring adults to set and attain new levels of aspiration.

Education for aging is to be looked upon as the new challenge. Psychologists have a re-

sponsibility for determining the ability of adults to learn some of the things needed for the enjoyment of leisure and for determining methods for teaching and involving the adult in learning situations in order that new techniques for creative experience may be gained. The educator is faced with the challenge of applying his knowledge to the requirements and proper teaching of adults so that they may have the opportunity to pursue the stimulating aspects of life into old age.

## Skill and Employment



My assignment is to try to indicate what we need to know about the organism as an efficient unit in relationship to aging. Of particular concern is the organism's essential goodness in terms of productivity.

Herein lies the implicit assumption that we ought to be able to assign some characteristic number to an individual which would serve as an index of his aging status much the same as the IQ is taken as a measure of intellectual capacity. While this represents an ideal, it is based on the assumption that there is some common factor involved in aging.

From a theoretical point of view, this is an important research problem. I see no reason why we should not attack it on a broad front much as we have approached the isolation of factors involved in other performances. We could apply a wide variety of performance tests to individuals over a wide age span and then see what common factors could be isolated from test results.

As I see it, until we have access to cooperative subjects in large numbers—with the active col-

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*By Nathan W. Shock, Ph.D., chief, Section on Gerontology, National Heart Institute, Public Health Service, Bethesda, Md., and visiting physiologist, the Baltimore City Hospitals. His brief is from the panel with the same title.*

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laboration of many research people and industry—we are going to be handicapped in describing age changes in performance. Since it appears that age changes are often related to reserve capacities, it is essential that any test batteries include measurements made not only under resting conditions but under conditions of measurable stress and displacement.

In addition, there is also the practicable problem of what older people can do. This is within the province of institutes of industrial relations and the research activities of private industries. A detailed job analysis, in order to determine the skills and conditions required for performance of these jobs, is an essential first step. Then would come an evaluation of the specific types of performance within aging workers, with the hope that ultimately requirements of the job and the capacities of the worker could be adequately matched.

Our laboratory (operated in collaboration with the Baltimore City Hospitals) has been interested in the problem of human performance for a number of years but has placed major emphasis on the physiological aspects of the problem, with an attempt to evaluate specific performance of organ systems as well as that of the total person. All I can hope to do is to present a few broad generalizations with respect to age changes in performance and to indicate questions which need further research.

### **Factors Affecting Performance**

Let us examine briefly some of the physiological limitations of performance that change with increasing age. When we are dealing with the human animal, the question immediately arises as to whether changes in physiological functions are due to disease or whether they can be regarded as the effects of age alone.

As I see it, we are interested in the performance of aging people, and if disease is an inherent part of the older organism, it will have to be accepted as such.

If we were able to study large numbers of individuals selected at random from the total population, we would not necessarily need to exclude subjects on the basis of medical examinations. However, when we choose subjects from an institution, we need to exclude subjects

with identifiable disease because the incidence of disease may be greater than in similar subjects living in the community. Thus, the research method and design depend on the population under study. Therefore, the first essential for effective studies of aging is the identification and description of the population under observation. Unfortunately, this has not always been done.

It is obvious that sensory changes may have an important bearing on performance. Rather extensive studies have shown that hearing for particularly high frequencies diminishes with increasing age. Studies on vision also show that the range of accommodation, visual acuity, rate and level of dark adaptation, pupil size, and the rate of flicker fusion frequency show a gradual impairment with increasing age. Vibratory sensitivity gives some indication of similar decrements with age. The problem of age changes in sensitivity to pain still awaits systematic investigation, owing largely to a lack of an acceptable objective measurement of pain.

Sensory changes associated with aging could serve as valuable indexes of the overall rate of aging in the individual even though they may be adequately corrected so that performance need not necessarily suffer. This also is a problem which has not been solved.

Of even greater importance to performance is the question of perception and the ability to extract information and utilize it in terms of behavior. This is a question which has received relatively little consideration from students of aging but for which extensive techniques have been recently developed by the Armed Forces.

The problem is one of determining the individual's ability to receive information presented simultaneously from a variety of sources and to abstract the information which is pertinent to specific performance. It would seem that this type of activity is one in which elderly people might show significant changes.

There is little doubt that the speed of performance diminishes with increasing age. This decrement in speed shows itself in studies of simple or complex reaction time, in speed of muscular movement, in psychological performance, and in even more complex performances included in many tests of intelligence.

Although Miles has demonstrated that reduction with age in performance includes both perceptual and effector processes, there is no information on the effects of age on the rate of performance of isolated muscle groups. Nor is there any information on the interrelationship in the same individual between speed of performance on different types of activity although a broad generalization would imply a relationship.

Welford, experimenting with the conceptions presented by Bartlett, has provided some evidence to indicate that simple measurements of the total time required for a given response should be supplemented with observations on the detailed segments of the total performance. Within this framework he has demonstrated significant age changes which otherwise would have escaped detection.

When we examine the performance of specific organ systems within individuals, we find a variety of age changes. Some systems show little evidence of functional alterations with increasing age. This is particularly true of measurements made under resting conditions where a number of physiological processes are involved in maintaining a stable equilibrium. However, under circumstances of physiological stress, age differences may be observed. For example, the rate at which the blood sugar is restored to resting levels, after the intravenous administration of excess glucose, diminishes significantly with increasing age. Similarly, the administration of an acid or an alkali requires more time in the older individual to readjust the acidity of the blood than in the young.

In other organ systems there is evidence of the reduction in function even in the resting state. For example, the amount of blood pumped by the heart, as well as the amount flowing through the kidneys, shows a gradual reduction as age increases.

Thus, our physiological studies have indicated that with increasing age there is a gradual reduction in reserve capacities and in the effectiveness of interorgan system correlation. A finding common to all these measurements is that the rate or speed of readjustment is diminished in the older individual.

We may well question the assumption that

the rate of metabolism of individual cells diminishes with age. While it is true that the basal oxygen consumption, taken as an index of overall rate of metabolism, diminishes gradually with increasing age, we cannot assume that this is a reflection of the rate of metabolism in individual cells. This is because with increasing age there is a gradual dropping out of functioning cells from various organs and tissues and an accumulation of body fat which does not contribute to metabolic activity. The apparent diminution in metabolism might well be a reflection of this change in functioning protoplasm and an accumulation of inert substances.

Our laboratory has attempted to relate basal oxygen consumption to a measure which might be more representative of the total amount of functioning protoplasm in the body. For this purpose, the total water content of the body, as measured by antipyrine, has been utilized. When the oxygen consumption per unit of body water is calculated for each individual, it is found that there is no decrement with increasing age.

When we turn to studies made on cells and tissues for an answer to this question, we face disappointment since relatively few studies on really old animals have been carried out and since no estimates of the number of cells remaining in the tissue slice, for example, have been made.

The effect of age on the ability to perform physical work has not been investigated extensively. Robinson's studies indicated that older people were unable to increase their pulse rates as effectively as young in response to exercise but did not find significant differences in oxygen uptake.

Similarly, Norris in our laboratory has found no difference in the efficiency of old versus young subjects performing standardized amounts of arm exercise. We do know, though, that older people are less able to perform heavy work and that their rate of recovery, with respect to pulse rate, respiration, or oxygen uptake, is diminished.

We also know that there is a gradual reduction in muscle strength and endurance in the higher age categories. Whether this diminution in muscle power is a result of loss of muscle cells, or whether it is more functional in nature

and comparable to an atrophy of disuse, is still an open question.

We do know that older individuals require a greater turnover of respiratory air in order to obtain a given level of oxygen uptake under conditions of exercise, but whether this is a respiratory impairment or can be ascribed to alterations in the capacity of the heart to pump blood is still another open question.

Although the mechanical efficiency of old and young is indistinguishable at moderate rates of work, at both low rates of work as well as at maximal rates of work, the mechanical efficiency of the older individual is impaired, Norris has observed. This opens an interesting point for investigation since the low efficiencies at slow rates of work in older people were completely unexpected.

It is possible that this impairment of efficiency is a reflection of poorer muscle coordination and impairment of neuromuscular control. Since the physical requirements of most jobs are minimal, the question of maximum workloads that older people can perform is of relatively little importance in problems of employment. Of greater importance is the question of endurance and the effects of repetitious tasks. This is a question which has not been systematically investigated on an agewise basis.

## Occupational Roles



The dynamics and interrelationships of occupational roles, health, and aging comprise one of the crucial problems of gerontological research. Gerontologists in general would accept as reasonable the hypothesis that occupational roles

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*By Milton L. Barron, Ph.D., associate professor of sociology, City College, New York. Participating in the panel on skills and employment, in addition to Dr. Barron, were Ross McFarland, Josef Brozek, Charles Odell, and Nathan Shock.*

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and health are significant independent variables in relation to the social psychology of aging.

In the chronologically advanced years of life, especially for men, aging as perceived by oneself and by others is largely a function of withdrawal from making a living and of decline in state of health. Research shows that people of 60 and over who are occupationally active and in good health are younger in their own eyes and in the eyes of others than are those who have withdrawn from the labor force and are in poor health.

Somewhat less success has been derived from efforts either to establish or to interpret the relationship between occupational roles and health in old age. Most, but not all, research findings in this area show a positive correlation between the two variables.

Even if our findings were consistent, we would still be confronted by the problem of the meaning of the correlations. Which of the two variables is independent, and which one is dependent? Some claim that occupational roles are independent and that health is the dependent variable. Others argue that health is a predisposing factor rather than a consequence of occupational roles.

A tentative resolution to this controversy lies in the following compromise stated by Mathiasen:

Persons who die soon after retirement in all likelihood are succumbing to physiological conditions which would have caused death whether they had retired or not, but this does not rule out the possibility that retirement shock may precipitate an occasional fatal cardiovascular accident. It is difficult to estimate the effect of the sudden cessation of work on health in the absence of any techniques for measuring quantitatively the effects of emotional disturbance on health or for separating precisely the psychosomatic disorders from organic disease.

We may be inviting continuing frustration if we persist in taking an either-or theoretical position even in this modified compromise. For there is an inherent limitation in assuming that occupational roles and health are related to each other exclusively as independent and dependent variables in a yet unknown pattern. It may be more rewarding in the long run to consider them as interactive partners in a re-

ciprocal relationship. Each probably acts and is acted upon by the other although not with equal influence.

### **Misplaced Research Emphasis**

Gerontologists working on the problem of occupational roles in old age seem to assume that the transition from employment to retirement is the crux of difficulties associated with occupational roles. Yet research findings indicate that the unemployed aged who do not consider themselves to be retired have more acute economic, psychological, and social problems than do the unemployed aged who do consider themselves to be retired.

The reluctantly unemployed in our older population deserve far more attention from researchers than they have been given. Unwilling to tolerate the economic idleness to which they have been relegated, this group has the most emphatic minority-group reactions of all occupational groups among the chronologically aged.

Some of our findings definitely suggest that we have been concentrating on problems of physical health when we should be studying more intensively the problems of mental health. Physical ailments in the older population are not as severe and widespread as they are generally reputed to be.

The relatively little gerontological research on mental disorders in later life indicates that they are more extensive than problems of physical health. The Cornell University survey revealed that the majority of the urban older people are troubled some of the time by psychosomatic symptoms, nervousness, and forgetfulness. Much more needs to be known about the social and cultural bases of the major mental disorders of later life.

### **Social Science Concepts**

The time is overdue for more utilization of relevant social science concepts and theory in gerontological research on problems in mental health as well as other problems of aging. Studies have already intimated that the kind of social relations in which older persons participate is a crucial factor in the etiology of

their mental disorders. These social relations are fruitfully characterized by orthodox social science concepts such as Durkheim's "anomie," Jung's "loss of significance," and Faris and Dunham's "isolation."

The theoretical framework basic to much contemporary social psychology seems to be adaptable to gerontological research on problems of mental health. This framework implies that the social self not only embodies the group's normal attitudes but also the frustrations and confusions of the group. Society's tensions and cultural contradictions contribute to the conditioning of the self. When the self is mentally and emotionally disordered as well as physically ill, the family, the neighborhood, and society itself constitute a considerable part of the etiology.

The attention of gerontological researchers should be drawn to other potentially relevant concepts and theoretical schemes of social science as well:

Does the self-fulfilling prophecy have any bearing on the dynamics of occupational roles and health in old age?

Can we hypothesize that expectations of morbidity and mortality in old age are intensified by retirement so that they become self-fulfilling prophecies expressed in hypochondria and functional symptoms of illness?

To what extent does psychological unemployability account for the difficulties of the unemployed aged who do not consider themselves retired in returning to gainful employment?

Is unplanned, involuntary, and abrupt retirement the kind of experience meant by the concept catastrophic reaction?

The need-for-illness concept is another social psychosomatic tool with gerontological possibilities. It describes a condition which is an outgrowth of repeated frustrations in the individual in attempting to handle complicated problems. The person does not consciously seek illness as an escape but rather the care that one receives in illness, the kind of care that corresponds to the maternal love given a child who has met difficulties.

### **Middle-Class Norms**

A pitfall to be avoided is the indiscriminate gerontological usurpation of concepts and the-

oretical frameworks from a heretofore youth-bound social science. More than an imminent danger, possibly an actuality, is the heavy reliance of research on middle-class norms. Are the concepts adjustment, social satisfactions, and avocational interests truly free of restrictive class connotations?

There is some basis to the suspicion that educators, scientists, physicians, clergymen, and industrial and business personnel—typical middle-class sources—have played a more influential part in defining the problems of aging and introducing these norms to an age status in urban industrial society than have the representatives of other social classes.

This suspicion is reenforced by our observations of the negligence of older people in preparing for retirement. Many of the norms for such preparation are implicit in hobbies, travel, avocations, and club sociability, for these activities offer more appeal and meaning to older people of the middle classes than they do to those of lower economic, social, and educational strata.

Relevant here is Noetzel's observation that in some counseling programs, foreign-born and semiskilled manual workers react negatively to

any discussion of hobbies. To them the word connotes "make work," childishness, or futile play. This becomes especially significant in the face of evidence that older people in our society are geared socially toward the working classes more than to any other social strata. The Cornell survey found that the majority of its respondents considered themselves to be members of the working classes. Furthermore, the formal education of the sample was geared toward the lower level of cumulative years of schooling.

Gerontological research on the dynamics and interrelationships of occupational roles, health, and aging obviously cannot rely completely on concepts and theory already available in the social sciences. There is need for new, imaginative theoretical formulations; for example, the typology recently put forward by Riesman for analyzing materials gathered in the Kansas City study of middle age and aging.

Riesman points out that reaction to aging in the United States is largely governed by norms that vary according to social group. Not only do we need to recognize the substrata among older people, we must also adapt norms to the various substrata.

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## Medical Problems of Atomic Warfare

Medical problems facing the military services and the Nation in an atomic war will be presented at the 3-day program of the Association of Military Surgeons of the United States, meeting in Washington, D. C., November 7-9, 1955, for its 62d annual convention.

Topics will include the medical effects of nuclear warfare; care of mass casualties, such as protective measures, initial aid and rescue, and treatment of large numbers of blast, thermal, radiation, and neuropsychiatric casualties; and organizing the various medical and technical specialists and facilities for managing thousands of casualties at one time.

Scheduled for addresses are the Chairman of the Atomic Energy Commission; the Assistant Secretary of Defense (Health and Medical); the Surgeons General of the Army, Navy, Air Force, and the Public Health Service; medical chiefs of the Veterans Administration and the Federal Civil Defense Administration; and representatives of the medical industries.